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of a country the coal of which is peculiarly adapted for reducing the metal. Yet, we import our coal, and we import our iron from England.

To the coal and to the iron of Ireland, we would particularly allude; because these substances are powerful engines to promote the most important branches of manufacture; but there are other mines deserving of attention. The copper mines in the south of Ireland are already known as extremely productive, and affording employment to some hundreds of people: but copper is not confined to the south; but will on examination be found in many other districts.

There is no denying that attempts have frequently been made to work mines in different parts of Ireland, and that those attempts have failed. But there are two ways of doing things—a right way and a wrong one, and unfortunately the wrong way, has chiefly been chosen in Ireland. Many of the mines were opened with an insufficient capital, and consequently the proprietors failed before any profits could be drawn from them; the first working of a mine is all outlay, and generally, the more that is expended in the first instance, the more profitable will the mine become.

To notice one cause of failure which has sometimes occurred in the working of the mines of Ireland—the injudicious manner in which the shafts were sunk, and the operations otherwise carried on from not employing, or at least consulting proper engineers; this has caused mines to be given up in despair, which might otherwise have proved productive, and we should hope, therefore, that some of our intelligent correspondents, interested for the welfare of their native land, will, from time to time, favor us with articles which may be calculated to remove erroneous impressions on this very important subject—or to suggest such methods of operation as may facilitate the exertions of those who are disposed to co-operate in the patriotic undertaking of *working the mines of Ireland*, in the way and manner best calculated to benefit the country. Nothing could more materially relieve our daily increasing population.

BALLYCASTLE COLLIERIES.

A more than ordinary interest is attached to the mines referred to in the preceding article, from a discovery accidentally made about seventy years since by some miners employed in the works. It is thus related by Mr. Hamilton, in his Letters on the Antrim coast:—About the year 1770, the miners, in pushing forward an adit toward the bed of coal, at an unexplored part of the Ballycastle cliff, unexpectedly broke through the rock into a narrow passage, so much contracted and choaked up with various drippings and deposits on its sides and bottom, as rendered it impossible for any of the workmen to force through, that they might examine it farther. Two lads, were, therefore, made to creep in with candles, for the purpose of exploring this subterranean avenue. They accordingly pressed forward for a considerable time, with much labour and difficulty, and at length entered into an extensive labyrinth, branching off into numerous apartments, in the mazes and windings of which they were completely bewildered and lost. After various vain attempts to return, their lights were extinguished, their voices became hoarse, and exhausted with frequent shouting, and at length, wearied and spiritless, they sat down together, in utter despair of an escape from this miserable dungeon. In the mean while, the workmen in the adit became alarmed for their safety, fresh hands were incessantly employed, and, in the course of twenty-four hours, the passage was so opened as to admit some of the most active among the miners; but the situation of the two unhappy prisoners, who had sat down together in a very distant chamber of the cavern, prevented them from hearing altogether the noise and shouts of their friends, who thus laboured to assist them. Fortunately it occurred to one of the lads, (after his voice had become hoarse with shouting) that the noise of miners' hammers was often heard at considerable distances through the coal works; in consequence of this reflection, he took up a stone, which he frequently struck against the sides of the cavern; the noise of this was at length heard by the workmen, who, in their turn, adopted a similar artifice; by this means each party was conducted towards the other, and the unfortunate adventurers extricated time enough to behold the sun risen in full splendour, which they had left the morning before just beginning to tinge the eastern horizon. On examining this subterranean wonder, it was found to be a complete gallery, which had been driven forward many hundred yards to the bed of coal: that it branched off into numerous chambers, where miners had carried on their different works: that these chambers were dressed in a workmanlike manner: that pillars were left at proper intervals to support the roof. In short, it was found to be an extensive mine, wrought by a set of people at least as expert in the business as the present generation. Some remains of the tools, and even of the baskets used in the works, were discovered, but in such a decayed state, that on being touched, they immediately crumbled to pieces. From the remains which were found, there is reason to believe that the people who wrought these collieries anciently, were acquainted with the use of iron, some small pieces of which were found; it appeared as if some of their instruments had been thinly shod with that metal."

Taking every circumstance connected with the civil and political state of this country into view, Mr. Hamilton inclines to think, that this colliery must have been worked at a very remote period—at all events, more than one thousand years since; and from this argues for the civilization of the inhabitants of Ireland at a period long antecedent to that at which it is generally considered the arts and sciences were first introduced here.

These collieries were some years since worked to a far greater extent than they are at present. The coals are found about 120 yards from the entrance, which is formed, not in the shape of a pit, as is usually the case, but by cutting into the face of the freestone rock, near the sea

SIMPLE SCIENCE.

Nature presents us with numerous instances of minute subdivisions, which utterly baffle our powers of conception.

Thus human hair varies in thickness from the 250th to the 600th part of an inch, and yet each one is a capillary tube. The fibre of the coarsest wool is about the 500th part of an inch in diameter, and the finest only the 1500th part. The silk line, as spun by the worm, is about the 5000th part of an inch thick; but a spider's line is, perhaps, six times finer, or only the 30,000th part of an inch in diameter, insomuch, that a single pound of this attenuated, yet perfect substance, would be sufficient to encompass our globe.

Animalculæ are so small, that many thousands together are smaller than the point of a needle. Leewenhock says, there are more animals in the milt of a codfish, than men on the whole earth, and that a single grain of sand is larger than four thousand of these animals. Moreover, a particle of the blood of one of these animalculæ has been found, by a calculation, to be as much less than a globe of 1-10th of an inch in diameter, as that globe is less than the whole earth. He states, that a grain of sand, in diameter but the hundredth part of an inch, will cover 125,000 of the orifices through which we perspire; and that of some animalculæ, 3,000 are not equal to a grain of sand.

It is ascertained by the microscope, that the smallest insects with which we are acquainted, are themselves infested with other insects as much smaller than themselves, as those are smaller than the larger animals that they infest. How inconceivably small then must be the parts of such organised creatures! But by analogy we may carry our reasoning still further, by conceiving that even these creatures may again be infested with others proportionally smaller, till we are as much lost in the scale of descent, as we are in that of ascent through the regions of the universe.

Hence this part of the creation, and the laws or organization, confound the inquiries of men even more than the vastness of the universe; for our most powerful microscope enables us to magnify with effect only 10 or

50 thousand times, whereas the atoms concerned in producing the phenomena of nature, are doubtless millions of times less than the smallest object which can be seen with the naked eye.

Odours are capable of a much wider diffusion, if we are to ascribe their action to the radiation of atoms, and not, as many suppose, to any affection of the medium by which they are surrounded. A single grain of musk has been known to perfume a room for the space of twenty years.

And a piece of wire gilt with eight grains, or the sixtieth of an ounce of gold, may be drawn out to a length of 13,000 feet, the whole surface of it still remaining covered with gold.

A grain of gold may be beaten to cover 50 square inches, which is then only the hundred-thousandth part of an inch thick; and still it maintains all its qualities as gold.

If a grain of gold be melted with a pound, or 5,760 grains of silver, and a single grain of the mass be dissolved in diluted nitric acid, the gold, though only the 5761st part of a grain, will fall to the bottom and be visible; while the silver remains dissolved in the acid.

A grain of silver may be beaten till a microscope shows 1000 distinct parts; if one of these be then dissolved, it will tinge 18,000 grains of water; a grain is, therefore, divisible into 18,000,000 sensible parts!

A pound of cotton has been spun so fine, that it would extend 168,000 yards, or 25 miles.

A quantity of vitriol being dissolved and mixed with 9000 times as much water, will tinge the whole; consequently it will be divided into as many parts as there are visible portions of matter in that water.

If a candle be lighted, it will then be visible about two miles round; and, consequently, were it placed two miles above the surface of the earth, it would fill with luminous particles a sphere whose diameter is four miles, and before it had lost any sensible part of its weight.

It is not, however, to be hence presumed that the space is filled with luminous rays, for rays of light travel 200,000 miles in a second, and 20 per second produce continuous vision. Hence, if we divide the circumference, 12 miles, or 7,200,000 tenths of an inch, there will, at one time, be but 1,440 rays emanating from the candle, so as to produce distinct vision two miles distant in every tenth of an inch.—The effect of odours may be similar. Indeed, a candle fixes oxygen while it parts with light.

GAMBLING.

The fashionable absurdities in these matters are equally amazing and destructive. Do not we see men passing their best hours, and their prime of life, in these scenes of folly, whose rank, fortune, and natural abilities, might entitle them to the highest offices in the Commonwealth? Degrading themselves to the low level of professed gamesters, and herding with these, as their chief intimates, their bosom friends: blind to every kind of merit, but that of the learned artist, whose boasted qualification is, that he is both able and willing to ease them of the useless burthen of an estate. Yet, fond as they are of this mad extravagance in theory, the practice of it is attended with the most consummate misery. As the tide of fortune ebbs, at least, as often as it flows, so the sad reverse, to which every adventurer is exposed, awakens by turns every gloomy and accursed passion of the soul. Here we may often see a numerous assembly of both sexes, chained down by the magic of the fatal circle; the sorcerer seated triumphant in the midst, with his instrument of deceit before him; at length the spell begins to work, and the engine of falsehood is put in motion; the enchanted crowd stand fixed with anxious eyes and beating hearts, till, in the end, fate proclaims the magician victorious; who, by secret and unsuspected arts, hath conveyed the wealth of his followers into his own pocket; leaving them nothing in return but the just reward of grief and vexation, indignation and remorse. Here one may often see the fairest faces dimmed with envy, or kindling into rage; by turns distracted with the tyranny of every vile affection; squandering those fortunes, which their provident and indulgent parents had bequeathed them, with far other hopes and expectations; setting to the hazard the very means of their future support.—Here, then, behold the wretch completed! Surrounded by a train of inextricable miseries! his fortune vanished beyond redemption! He cannot work; and to beg he is ashamed: he hath disgraced his ancestors, and ruined his posterity: behind him he sees nothing but guilt and shame; before him, nothing but misery and despair. What then remains, but that he throws the last fatal dye for eternity, and conclude the horrid scene by a halter, a dagger, or a pistol! Or if his fury, horror, and despair, break not forth upon himself, they are sure to discharge themselves on his fellow-creatures. His intemperate wants call aloud for gratification; and force must restore what folly deprived him of. Hence the spirit of violence hath gone out among us, and the land is filled with robbery and murder.

THE TERM RILIVIO.

This term, improperly spelled *relievo*, as applied to sculpture, signifies the representation of any object projecting or standing forth from the plane on and commonly *out* of which it is formed. Of rilievos there are three kinds, *basso, alto, and mezzo*—the first is when the projection is less than one half of the natural thickness, such as is seen in coins and medals—the second, when one half of the figure emerges—the third, when the figure is so completely salient, that it adheres to the plane only by the narrow strip. *Cameos* are semi opake gems, consisting of two or more coats of different colours, aud of sufficient thickness to admit of shaping the uppermost into a figure in *basso relievo*, which is thus made to rest on a ground of a different colour.

A BROTHER'S LAMENT.

On the 18th of February 1782, I saw a young man, said to be deranged, standing on the sea shore, watching a spot where his sister was drowned five years before, returning from Ireland.—*Sinclair's Norway.*

That ocean wave, that ocean wave,
It rolls above my sister's grave,
Hymning a requiem deep and dull,
O'er her who once was beautiful.

When last yon harvest moon was bright,
She roved in thought beneath its light:
Yon harvest moon is waning low,
And Isabel where is she now?

I saw her die, I saw her die,
She fixed on me her closing eye,
In fond farewell I rush'd to save,
But she was in her ocean grave.

She passed away, she passed away
Like sunshine on an April day;
The harvest moon looked down from high,
But she was in eternity.

When life, when love, when all was o'er,
The wave crept gently to the shore;
The winds slept, and the sullen sea,
Seemed weeping for its cruelty.

But all too late, I wandered home,
Hopeless as tenant of the tomb,
For I had not one friend to bless
My cottage hearth of loneliness.

The bee hummed by my silent bower,
The thrush sung blythe to shrub and flower,
And summer wind came laughing by
As if to mock my agony.

They felt not grief, they could not know
A sister's death, a brother's woe;
They could not,—but my brain—my brain—
'Tis phrenzied, racked, and seared again;

So fare thee well, so fare thee well,
My sister—ocean rings thy knell,
And sea nymphs in their cavern's rude
Keep sacred thy sweet solitude.

DUBLIN.
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